REMARKS

Claims 1-17 and 19-21 are pending. Claims 1, 10, 15, and 17 have been amended. Claim 18 has been cancelled. Reconsideration and allowance of the present application based on the following remarks are respectfully requested.

Claim Rejections Under 35 U.S.C. § 103

Claims 1, 2, 4, 5 and 7-21 were rejected under 35 USC § 103(a) over Poladian et al. (WO 99/67664). Applicants respectfully traverse this rejection.

Claim 1, as newly amended, recites an open loop method of reducing predictable systematic errors in grating writing in an optical waveguide. This includes numerically designing a theoretical test grating structure for desired spectral characteristics, and writing a complete test grating structure experimentally in a first portion of a first waveguide and according to the design of the theoretical test grating structure. The actual spectral characteristics of the complete test grating structure are then measured after it has been written, and an actual design of the complete test grating structure is then reconstructed from the actual spectral characteristics. Subsequently, a complete compensated grating structure is written using a compensated design based on a pre-comparison of the initial numerical design with the actual design of the complete test grating. It will be appreciated that the term 'open loop' has been used to emphasise the distinction between the claimed invention and the Poladian et al reference, in that it denotes the lack of active feedback in the claimed method during the actual greeting writing process to correct for random errors.

Poladian et al teaches a closed-loop grating writing correction method using real-time feedback. An active feedback compensation technique is used 'for ongoing monitoring' of the state of the grating structure (see page 3 at lines 32-33). This is based on the fact that any grating structure has a minimum characteristic length scale which is inversely proportional to grating bandwidth, and is usually of the order of tens or hundreds of microns. Oscillations of grating profile with a period finer than this minimum length scale do not change grating spectral characteristics. The invention disclosed in Poladian takes advantage of this phenomenon to teach real-time correction of errors. A minute portion of grating which is a lot smaller than the minimum characteristic length of the grating (typically of the order of 5 microns) is written and the deviation of the grating profile from the desired theoretical profile is dynamically measured. The next portion of the grating is then written to with a correction to make the averaged grating profile fit the desired one. This closed loop feedback procedure is iterated in the formation of a single complete grating so as to provide for an ongoing

monitoring of the state of the grating structure as it is being formed (see page 3 lines 29-31 of Poladian). As regards the Examiner's view that Poladian et al discloses a method of reducing systematic errors, it is specifically stated on page 3 at lines 22-23 of Poladian et al that "these deviations are generally not predictable," in contrast to the predictable systematic errors which the newly claimed invention aims to reduce.

At least in theory, the closed-loop method disclosed in Poladian et al can achieve an absolute error correction encompassing the correction of unpredictable and random errors. In reality, deviations of actual grating profile from the desired grating profile need to be measured with extreme accuracy and speed to achieve a desired result. This has proved exceptionally difficult to achieve, even at a prototype level.

In the open-loop approach of the present invention real time closed-loop control principles are avoided. Only errors which are systematic and predictable are accordingly corrected, and not those which are random and unpredictable. A significant advantage of the present invention is that it does not have the combined high speed and accuracy requirements of Poladian et al, which make the latter so difficult to implement, whilst at the same time essentially eliminating all predictable systematic errors.

On page 3 of the Office Action, it is alleged by the Examiner that the writing of a complete test grating is equivalent to writing the initial portion of the grating structure of Poladian et al. As has been pointed out above, Poladian et al's "portions" are written in sequence next to one another and only comprise a complete structure at the end of the writing procedure, which includes real-time corrections for random errors arising in the portions. In contrast, the present invention is directed towards revealing systematic and predictable errors or distortions in an experimental grating by writing an appropriate complete test structure and by analysing its spectral properties only after it has been written. The analogy between an initial portion of a grating structure and a first portion of a first waveguide in which a complete test grating structure is written has, with respect, no foundation.

As is conceded in the Office Action, Poladian et al does not disclose the initial step of numerically designing a theoretical test grating structure for a desired spectral characteristics, and then writing a complete test grating structure experimentally in a first portion of a first waveguide. Poladian et al neither discloses nor suggests this for the reason that it teaches a completely different method of forming a grating. Even if it were necessary to set an initial grating period in Poladian et al to commence the grating writing process, this does not teach or suggest the claimed method, in that the entire motivation underpinning Poladian et al is based on a closed-loop method of writing a single grating using a real time feedback

correction method as portions of the grating are written. If anything, Poladian et al thus teaches against the claimed steps of numerically designing a theoretical test grating structure and then writing a complete test grating structure experimentally, as these steps specifically avoid any feedback during the writing process, and intentionally provide a complete error-ridden grating.

Claim 15 is believed allowable for at least the same reasons presented above with respect to claim 1 as claim 15 recites an open loop method of writing a grating structure in a portion of the first optical waveguide utilising a grating writing arrangement wherein predictable systematic errors in grating writing are reduced. A method includes utilising compensation information gained from writing with complete test grating structure experimentally using the same grating writing arrangement and according to the theoretical test grating structure design. The actual spectral characteristics of the complete test grating structure are measured after it has been written and the actual design of the complete test grating structure is reconstructed from the actual spectral characteristics. As has already been discussed above with respect to claim 1, Poladian et al clearly does not teach or suggest these features.

Claim 17 as newly amended is now believed to be in order for allowance for the same reasons presented above with respect to claims 1 and 15. In claim 17, an open loop arrangement for grating writing in an optical waveguide is recited. The arrangement comprises a processing means arranged, in use, to control the writing of grating structure based on a theoretical grating design and compensation data obtained for the arrangement to pre-compensate for systematic errors. The compensation data is of a type obtained from conducting the steps recited above with respect to claim 15.

Claims 2, 4, 5, 7, 11-14, 16 and 19-21 are believed allowable for at least the reasons presented above with respect to claims 1, 15 and 17 by virtue of the dependency upon these claims. Accordingly, applicants respectfully request reconsideration and withdrawal of this rejection.

Conclusion

Applicants appreciate the Examiner's indication that claims 3 and 6 contain allowable subject matter and would be allowable if written in independent form to include all of the features of the base claim and any intervening claim (as they then existed). However, in view of the foregoing, all of the claims are believed to be in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved

through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

All objections or rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a notice to that effect is earnestly solicited.

Please charge any fees associated with the submission of this paper to Deposit Account Number 03-3975 under Order No. 7287/283718. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,

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